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Joint Suppression of Enemy Air Defenses (J-SEAD):
A Command and Control Method to Counter the Mobile Air Defense Threat

By

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A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.

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Abstract
During Desert Storm, U.S. forces relied heavily on space-based assets to defeat an enemy. For the first time, space assets played a key role, and America has since grown even more dependent on these capabilities. Warfighting Commanders-in-Chief (CINCs) now routinely plan exercises and employ forces under the assumption that they will have unimpeded access to navigation and communications satellites as well as meteorological and Intelligence, Surveillance and Reconnaissance (ISR) platforms. But if one or more of these fragile capabilities are diminished as the result of enemy action, or simply because of natural phenomenon, how quickly can we replace the neutralized satellites? The answer is not comforting, and revolves around the limited capability of the U.S. spacelift program. Attention has been especially focused on this program during periods following major failures. In addition to the loss of life, launch failures have cost our nation billions of dollars, significantly reduced our access to space for lengthy periods, and resulted in delayed deployment of next-generation national ISR assets. While many measures taken after these disasters were effective in getting America back in space, much work remains. Our launch programs must become more responsive to the warfighting CINC. It simply takes too long to get a working satellite ready for operations. Secondly, the government needs to work more efficiently with industry. National security depends on the ability of American launch service providers to compete well with thriving foreign counterparts. Finally, U.S. launch programs must become robust and less reliant on single-points of failure.

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Abstract of

JOINT SUPPRESSION OF ENEMY AIR DEFENSES (J-SEAD):

A COMMAND AND CONTROL METHOD TO COUNTER THE MOBILE AIR DEFENSE THREAT

Long-range, mobile air defenses possess the ability to prohibit fires and maneuver throughout the Joint Operations Area. J-SEAD doctrine must modify existing command and control methods to destroy located mobile air defenses within minutes. Operation ALLIED FORCE highlighted the inadequacy of current U.S. joint suppression doctrine to responsively counter mobile ground-based air defense (GBAD) systems. In order to reactively destroy advanced GBAD, the Joint Force Commander should designate the Joint Forces Air Component Commander (JFACC) as the 'J-SEAD Manager.' This concept ensures unity of effort at the Joint Task Force level in suppressing GBAD threats, and enables uninterrupted air, land, and maritime operations.

INTRODUCTION

Today the U.S. military faces a paradox: the general military threat is diminished, yet the specific suppression of enemy air defense (SEAD) threat continues to expand. Even as dedicated SEAD resources age into obsolescence, and high-volume, long-range surface fires are retired without replacement, the sophisticated, threatening electro-magnetic environment continues to grow.[1] Instead of large masses of less capable missiles like the SA-3 and SA-6, adversaries will likely employ advanced, long-range missiles such as the SA-10 and SA-12.[2]

Fixed- and rotary-wing aircraft, cruise missiles, and smart stand-off munitions are all susceptible to the increasing threat presented by such sophisticated air defense technologies worldwide. In concert with ballistic missiles, coastal surface-to-surface missiles, and naval mines, advanced ground based air defense (GBAD) systems have the potential to deny U.S. military operations throughout many critical regions of the world.[3] As Chief of Naval Operations Admiral Jay Johnson stated in 1997:

> If we cannot command the seas and the airspace above them, we cannot project power to command or influence events ashore … it is an *area-denial threat* [emphasis added] whose defeat or negation will become the single most crucial element in projecting and sustaining U.S. military power where it is needed.[4]

Aerial fires are the remaining 'explosive' in U.S. power projection but are insufficient to forcibly gain access to areas defended by advanced ground based air defenses. Joint suppression methodology is not adequately responsive to address the mobility of such systems, as highlighted during Operation ALLIED FORCE in 1999. Joint Suppression of Enemy Air Defense (J-SEAD) doctrine should establish the Joint Forces Air Component Commander (JFACC) as the 'J-SEAD Manager' and modify existing command and control methods to destroy mobile air defenses prohibitively interfering with aerial fires. This

concept will enable air, land, and maritime operations throughout the Joint Operations Area (JOA).

THE THREAT: Mobile, Lethal, and Connected

The extended reach of advanced air defenses is one facet of the J-SEAD problem. Advanced GBAD combine range with mobility, multi-spectral acquisition and tracking techniques, and integration within adaptive, area-wide command and control networks. Advanced air defenses are proliferating in several potential regions of concern, and collectively, present a formidable danger to joint operations.

Russian Almaz S-300P (SA-10) and Antey S-300V (SA-12) air defense families represent this emerging threat to U.S. aerial fires. Manufacturers advertise the ability to engage aircraft, cruise missiles, and tactical ballistic missiles out to 250 nm.[5] A missile battery can deploy into an unprepared site and engage targets within five minutes; following missile intercept, firing units can re-locate just as rapidly.[6] Long-range, mobile GBAD concern J-SEAD planners the most, because intelligence cannot predict their positions reliably.[7]

Future GBAD systems, including upgrades to the SA-10 and SA-12 families, will enhance the lethal combination of range and mobility with active and passive, multi-spectral techniques for target detection, tracking, and engagement. Employing long-range detection approaches, such as bistatic processing and spread-spectrum waveforms, radars will be capable of acquiring targets well beyond the horizon with clarity.[8] With such target detection capabilities, it is fair to assume that adversaries will aggressively seek to unmask 'stealth' aircraft.[9] It is a historic law of weapons development that such innovative concepts will eventually be negated.[10] While some may argue that stealth aircraft such as the B-2 bomber

and F-22 fighter are not vulnerable to these advanced threats, the reality is that "…the majority of aircraft in the U.S. fleet will not have stealth capabilities for many years and will still require suppression support."[11]

Further compounding the problems of increased engagement ranges and new target detection methods, the fixed-site, centralized control of past air defense structures is rapidly disappearing. Today, mobile air defense systems are networked together through redundant paths including conventional telephone cables, coaxial cable, fiber optics, and a multitude of highly directional microwave and radio links.[12] As mobile GBAD elements relocate to a new site, they 'plug' back into the integrated air defense system (IADS) and the entire network is adjusted accordingly.[13]

Such adaptive networks and advanced air defenses are currently deployed in several potential areas of concern to J-SEAD planners. Wider proliferation can be expected in the very near term through sales and licensed production. For example, Russia has sold the latest variants of the SA-10 to Iran, Syria, Greece, Croatia, and the Peoples Republic of China (PRC).[14] India has contracted with Almaz for six SA-10 batteries and signed a deal with Antey for an undisclosed number of SA-12b batteries.[15] In 1997, The PRC began production of the HQ-9 surface-to-air system, a hybrid of SA-10 and U.S. Patriot technology, and has pursued licensing rights for the SA-10 since the mid-1990s.[16]

The J-SEAD community faces potential enemies capable of fielding state-of-the-art weapons with increased lethality, detection range, mobility, and connectivity. The mobility and extended ranges of future air defenses demand that the focus of J-SEAD fires shift from suppression to the destruction of GBAD systems in order to ensure uninterrupted maritime, land, and air operations. As a 2001 Government Accounting Office report states, "The

services have not adequately adapted to the evolution of enemy air defenses from fixed, stand-alone radar systems that could easily be suppressed into IADS incorporating modern telecommunications links, passive sensors, and other sophisticated means of avoiding suppression."[17]

J-SEAD TODAY: Pre-Planned Suppression of Yesterday's Threat

Developed in the early 1990s to defeat fixed-site air defenses, current J-SEAD methodology does not adequately address either the mobile nature or increased range of advanced GBAD systems. Joint Pub 3-01.4: *JTTP for Joint Suppression of Enemy Air Defenses* acknowledges that long-range surface-to-air missiles could "influence friendly airborne platforms well into friendly airspace;" however, the publication goes on to state that these systems are "usually located in fixed sites."[18] These immobile, long-range threats are not time critical; they and can be located and destroyed, either by aerial or surface fires, after deliberate planning.

Of the three defined types of J-SEAD – Joint Operations Area / Area of Responsibility (JOA/AOR), localized, and opportune – JOA/AOR air defense suppression is the most applicable in dealing with advanced, long-range air defenses. JOA/AOR air defense suppression is "conducted in support of campaign operations" based upon Joint Force Commander (JFC) operational objectives and may include joint force capabilities other than aerial fires.[19]

However, because JOA/AOR air defense suppression emphasizes fire support planning requirements for pre-planned targets, it remains ineffective in dealing with mobile air defenses. By the time a mobile air defense target is located and appropriate planning conducted to execute a strike, future threats will be able to engage a number of friendly

aircraft and move back into hiding. As evidenced over the past decade, "operators of modern air defense networks are acquiring the good sense not to stay put" and oblige existing J-SEAD doctrine.[20]

The ponderous approach of current J-SEAD procedures stem from contradictory command and control responsibilities established for planning and conducting joint suppression. Both the Director of Operations (J-3) and the JFACC possess inconsistent J-SEAD planning and execution responsibilities that create confusion as to who really leads the J-SEAD effort. The JFACC is normally tasked to plan and execute J-SEAD because the vast majority of current suppression focuses on air operations. However, without specific JFC direction, service components tend to balk when the JFACC requests JOA/AOR air defense suppression assets from limited fire support resources.

With the increasing lethality and mobility of modern air defense systems, the emphasis of JOA/AOR air defense suppression must shift from support of air operations to that of an 'enabler' for joint fires and maneuver in all media – air, land, and maritime – throughout the JOA. As Joint Pub 3-09: *Doctrine for Joint Fire Support* states, "maneuver and fires are complementary functions."[21] Together they allow components to gain positional advantage in order to accomplish their objectives. J-SEAD is the ultimate enabling mission for operational fires and maneuver: it peels back the overlapping layers of an adversary's air defenses and enables unimpeded aerial fires and rapid maneuver.[22]

Over the past eight years, the Department of Defense (DOD) has expended significant time and money to improve air defense suppression and assure continued aerial fires and maneuver despite the presence of advanced air defenses. However, True J-SEAD approaches have been bogged down in service parochialisms and disputes over authority.[23] One example

is the J-SEAD Joint Test and Evaluation (JT&E) program, a four-year $23.3 million program headquartered at Nellis Air Force Base, Nevada. This DOD-sponsored program has focused exclusively on modifying airborne ISR architecture and quantifying the improvements in J-SEAD responsiveness derived from rapidly disseminating enemy air defense intelligence to air component commanders and platforms.[24]

Like the J-SEAD JT&E program, the majority of service-specific suppression improvements are focused on technological solutions: expanding ISR capabilities, fielding munitions with greater stand-off range that preclude aircraft from having to enter threat envelopes, and improving self-protection equipment to preserve aircraft once they are engaged by ground based air defenses.[25] Despite such extensive efforts to improve J-SEAD capabilities, joint doctrine remains unaltered; its methods have not kept pace with the rapidly evolving air defense practices of today.

OPERATION ALLIED FORCE: Frustrated SEAD

Operation ALLIED FORCE illustrated the inadequacy of current J-SEAD methods to address mobile air defense systems. Using 1960s equipment and innovative employment techniques, Yugoslav Air Defense Forces protected critical resources against an enemy possessing overwhelming air superiority but shackled by outdated doctrine.[26]

Initially, SEAD attacks were only approved against limited, fixed air defense targets with the intent of "softening up," not destroying, Serbia's integrated air defense system.[27] Throughout the 78-day operation, rolling back the IADS never became a priority.[28] Capitalizing on their mobile air defenses, redundant command and control network, and well-trained operators, the Serbians devised a survival plan that thwarted allied SEAD efforts

while preserving a large portion of their assets and posing a continuous threat to allied aircraft throughout the AOR.

Serbia's GBAD were linked by underground communications lines and fiber optic cables, and supplemented by a robust civilian and military visual observer network.[29] Constant relocation of air defense missiles and radars confounded J-SEAD efforts to locate and destroy these threats, yet simultaneously maintained an accurate air defense picture. NATO did not succeed in its efforts to isolate GBAD in Kosovo from organized command and control due to the extensive network of buried landlines, and overlapping civil-military communications structures. Furthermore, fused radar input from outside Kosovo was fed through these multiple pathways and "enabled the southern Sector Operations Center to cue air defense weapons" without having active radar anywhere nearby.[30]

NATO's cumbersome command and control arrangements, coupled with the requirement for Combined Air Operations Center approval prior to attacking pop-up air defense targets further limited SEAD success during Operation ALLIED FORCE. These constraints resulted in "many lost opportunities and few hard kills of enemy surface-to-air missile (SAM) sites."[31] Even as fighters with precision munitions loitered near tankers over the Adriatic, the protracted approval process prevented attackers from catching and destroying air defense radars and missile batteries before they moved to new locations.[32] The timeliest option to destroy mobile Serbian air defenses – diverting aircraft enroute to pre-planned targets – rarely occurred.[33] By mid-April, aircrew frustration over the persistent radar-guided SAM threat led to the introduction of "flex targeting" to reactively destroy enemy air defenses.

Despite introducing flexible targeting options, the tedious NATO command and control structure prevented allied aircrews from destroying mobile Serbian GBAD, and forced Combined Forces Air Component Commander (CFACC) planners to allocate a "larger-than-usual number of sorties to SEAD missions."[34] Even with this increased SEAD presence, the "average aircrew participating in Operation ALLIED FORCE experienced a missile launch rate three times that encountered by the average coalition aircrew during Desert Storm."[35] This constant missile threat diluted the mass of NATO aerial fires against fielded Yugoslav forces in Kosovo and against Serbian infrastructure targets throughout the country. Concurrently, this persistent threat forced CFACC planners to place high value aircraft such as the U-2 and Joint Surveillance, Target Attack Radar System (JSTARS) in "less than ideal orbits," and kept the Army's AH-64 Apache attack helicopters out of combat altogether.[36] Thus, the Serbs effectively denied high-risk targets, oft times high-value targets, for a time and forced limited SEAD aircraft to accompany all strike packages, regardless of their assigned mission.[37]

Even as Serbian Air Defense Forces repeatedly stymied allied SEAD efforts, conflicting U.S. service views on SEAD asset employment precluded a responsive J-SEAD solution. Army officers insisted that SEAD support for AH-64 attack helicopters would only come from organic Multiple Launch Rocket System (MLRS) with Army Tactical Missile System (ATACMS) munitions.[38] This decision presented two related problems for CFACC SEAD planners: it precluded fixed-wing SEAD support for helicopter operations, and it simultaneously denied a responsive, combined arms J-SEAD option capable of destroying mobile Serbian air defense as soon as they revealed themselves. Furthermore, the inclusion

of MLRS/ATACMS would have freed dual-role F-16 and Tornado SEAD aircraft to execute additional strikes.

Ultimately, after two months of continual bombing and "daily NATO claims of the air defense network destruction," the Yugoslav army departed Kosovo with long lines of intact armor and air defense vehicles.[39] Both unilateral and U.S.-led operations over the past two decades have undoubtedly educated potential adversaries, and the lesson is clear: the U.S. will continue to heavily rely on aerial fires to achieve its operational objectives, and will approach SEAD today much the same as it has since Vietnam. Given the success Serbia demonstrated in preserving its air defense forces through simple 'shoot-and-scoot' tactics, and the implications when considering future air defenses, J-SEAD planners must re-think pre-planned, fixed-site suppression approaches.

The ineffectiveness of J-SEAD operations against Serbian mobile air defenses demonstrates the need to provide responsive destruction rather than traditional suppression.[40] As illustrated in Kosovo, if mobile air defenses are not immediately destroyed when located, they will continue to interfere with, and potentially preclude, air operations. Moreover, the extended range and increased lethality of advanced GBAD may prohibitively interfere with fires and maneuver throughout the JOA. Thus, J-SEAD planners must possess a method to destroy mobile GBAD threats within minutes to preclude interference with aerial fires and ensure joint operations continue unimpeded.

FUTURE J-SEAD: Reactive Destruction

Despite eleven years of joint and combined air operations over Iraq and the Balkans, and millions of dollars invested in joint test and evaluation, J-SEAD command and control structures remain frustratingly incapable of destroying mobile air defense threats. Operation

ALLIED FORCE emphasized the need for fire support coordination sufficient "to locate key defensive systems in real time and make use of limited assets to destroy them."[41]

The planning and coordination requirements to destroy mobile J-SEAD targets are essentially the same elements required to provide effective Joint Close Air Support (J-CAS). However, the services have not adopted an equivalent approach for J-SEAD targeting. To be effective and time-sensitive, J-SEAD requires an articulated command and control structure that facilitates reactive fires similar to that currently available in J-CAS.

Lieutenant Colonel James Brungess identified the need for this reactive J-SEAD structure as early as 1994, stating:

> Needed is a process that… accommodates change, transfers information fluidly from one portion of the process to the next… and relates relevance of activity to objective accomplishment. The process will need to be self-adjusting to unanticipated changes and events.[42]

Contemporary J-SEAD doctrine identifies the major 'actors' required for this adaptive structure: the JFC, the Joint Targeting Coordination Board (JTCB), the JFACC, and the service components. However, doctrine does not sufficiently delineate their roles and responsibilities to allow reactive J-SEAD coordination and execution at the JOA/AOR level. To provide responsive, coordinated J-SEAD fires and quickly destroy located air defenses, the JFC should designate the JFACC as the J-SEAD Manager.

Since the JFACC is normally assigned responsibility for JOA/AOR air defense suppression, designating him as the J-SEAD Manager is the optimal choice for this reactive targeting concept. As the J-SEAD Manager, the JFACC would consolidate the planning and execution responsibilities for pre-planned and reactive air defense destruction under a single entity, ensuring unity of effort. Figure 1 illustrates the command and control structure for the proposed J-SEAD Manager concept.

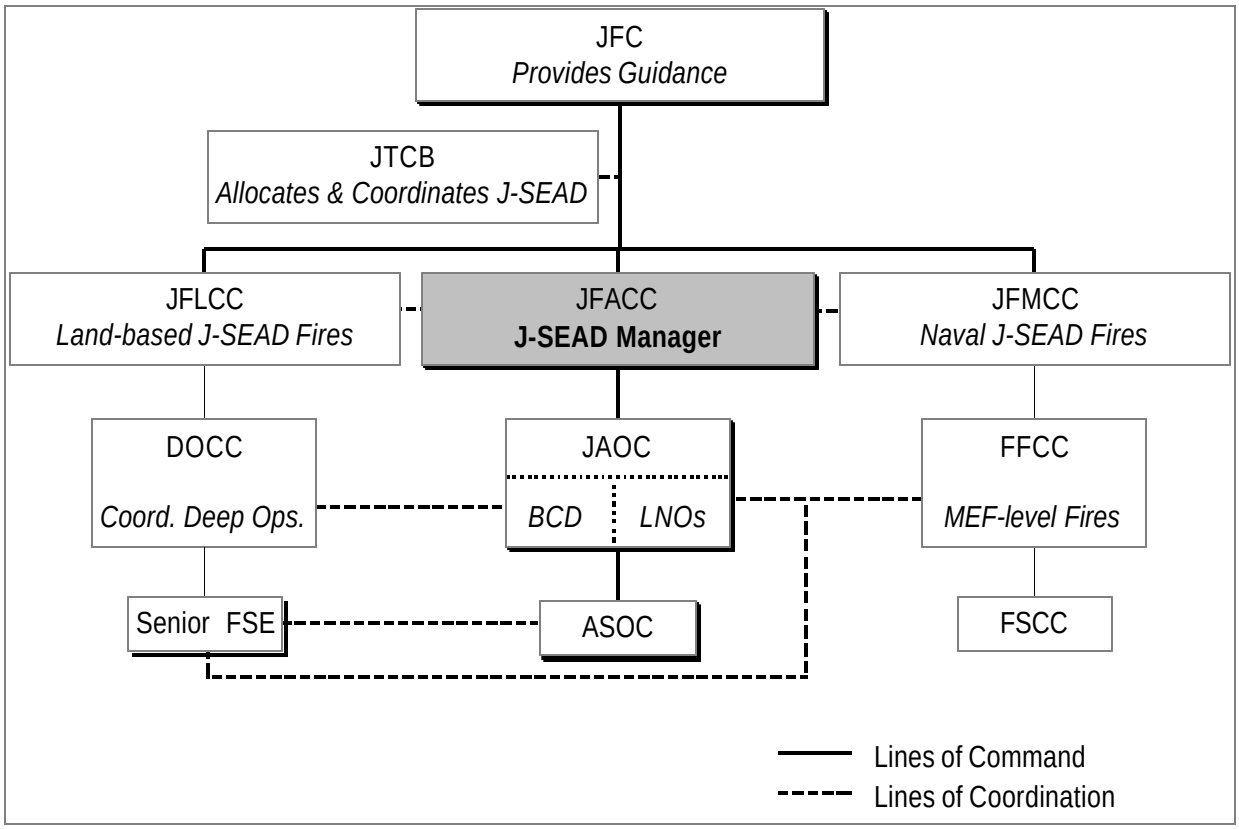

Figure 1: Proposed J-SEAD Command and Control Structure

To provide effective, reactive JOA/AOR air defense suppression, the J-SEAD Manager concept requires three items to be unambiguously delineated. First, the J-SEAD Manager must have authority over all J-SEAD assets. Second, the J-SEAD Manager must have access to real-time intelligence that allows him to locate mobile air defenses within minutes. Finally, based on this intelligence, the J-SEAD Manager must possess the command and control structure to direct timely destructive J-SEAD fires throughout the theater.

Designating the JFACC as the J-SEAD Manager would establish the required authority to direct and employ theater suppression capabilities toward the common goal of attaining JFC objectives. This unity of effort would ensure the application of sufficient mass to locate

and destroy JOA/AOR air defense threats, eliminate duplicative localized suppression from components, and preserve an economy of fires.

Next, in order to deliver destructive J-SEAD fires, the J-SEAD Manager must possess real-time intelligence focused on target geo-location. As mentioned previously, much time and effort has been invested in integrating the airborne intelligence, surveillance, and reconnaissance network into J-SEAD.[43] The JFACC currently directs the vast majority of ISR capability within the JTF necessary for reactive J-SEAD targeting through assets such as the U-2, RC-135 Rivet Joint, unmanned aerial vehicles, JSTARS, and Airborne Warning and Control System (AWACS). The air component will most likely receive initial notification of air defense threats prohibitively interfering with aerial fires and operations from these long-range sensors.

Finally, based on this intelligence, the J-SEAD Manager must have the command and control capability to direct J-SEAD fires throughout the theater in order to destroy emerging threats. The JFACC possesses this command and control ability through the Joint Air Operations Center (JAOC) and its subordinate, the Air Support Operations Center (ASOC). The JAOC and ASOC bring together liaison elements for coordination and integration of joint fires. By Joint Fire Support doctrine, the ASOC is collocated with the senior Army Fire Support Element (FSE). Both the JAOC and ASOC possess the connectivity to pass required J-SEAD targeting from the JFACC, as J-SEAD Manager, to the senior FSE and process requests for J-SEAD from the ground and maritime components. Marine Corps and Navy fire support agencies have liaison elements within the senior FSE and could also be tasked for reactive J-SEAD missions, if required.

In order for the J-SEAD Manager to be effective in directing reactive, destructive JOA/AOR air defense suppression fires, three procedural controls must be clearly established. First, the concept of prohibitive interference must be defined. Second, pre-planned and on-call J-SEAD assets must be allocated to the J-SEAD Manager based on a prioritization of fire support resources. Finally, the J-SEAD Manager must possess divert authority to re-direct joint fires if prohibitive interference is encountered.

The JFC must establish what conditions define prohibitive interference to aerial fires, and would thus require land or maritime fires in a suppression role. Prohibitive interference is the degree of obstruction that prevents the accomplishment of JTF or JFC aerial fires missions. It is subjective – influencing factors may include asset attrition and mission aborts.[44] Prohibitive interference implies that aerial fires are incapable of striking their intended targets without suffering unacceptable losses. In response, long-range surface fires may be the only means available to quickly eliminate the threat and proceed with joint operations.

As an example, an SA-12 battery engaging multiple aircraft and preventing the interdiction of a ballistic missile complex capable of chemical or biological weapons (CBW) delivery would be considered prohibitive interference. For effective operations to continue, and to preclude future interference, this SA-12 missile battery must be located and destroyed as a precursor to eliminating the ballistic missile and the CBW threat. Currently, only ATACMS is available to counter the extended range, prohibitive interference in this example. In the future, developments such as the 250 nm Vertical Launch Gun System may offer an alternative.[45]

Overcoming prohibitive interference ensures the J-SEAD Manager can support operational fires through JOA/AOR air defense suppression, for both pre-planned and reactive targets. Pre-planned J-SEAD fires are preferred – they allow detailed integration for anticipated time-sensitive targets and deconfliction with other air operations through the Air Tasking Order.[46] Reactive J-SEAD fires, on the other hand, must be tasked and coordinated similar to 'on-call' and 'pre-planned on-call' fires for J-CAS. For the J-SEAD Manager concept to succeed, J-SEAD planners must have specified joint fire support assets allocated to them for pre-planned and reactive suppression to permit adequate planning and coordination.

Through their range and lethality, advanced GBAD systems possess the ability to preclude JTF operations throughout the JOA. This places them in the category of 'high value' or 'high priority' targets that fall within the purview of the Joint Targeting Coordination Board for allocation and coordination. One JTCB responsibility is to ensure J-SEAD requirements are provided by all components. According to Joint Fire Support doctrine, the JTCB is the coordinator for integration and synchronization of joint fires.[47] Under the J-SEAD Manager concept, the JTCB would serve as the adjudicative authority for the allocation of land and naval fires required for J-SEAD. Based on the recommendation of the J-SEAD Manager, the JTCB would prioritize and allocate surface and/or naval fires in response to prohibitive interference. Ultimately, prioritization aids both J-SEAD and component planners by distributing limited fire support assets to meet multiple, competing requirements and enable concurrent operations to attain JFC objectives.

Finally, to effectively deliver reactive, destructive fires, the J-SEAD Manager must possess authority to re-direct additional aerial and surface fires against fleeting JOA/AOR air

defense suppression targets. Obviously, diverting fires from another component is the least desirable option since other missions will have to forego planned support integral to the scheme of maneuver. Logically, divert authority is only granted by JFC, and then sparingly. Thus, to obtain such authority, the J-SEAD Manager must possess adequate awareness of the current situation as well as a solid understanding of future requirements before diverting long-range fires to J-SEAD missions. Of all the components, the JFACC maintains the greatest situational awareness available within the JTF based on the extensive network of airborne ISR sensors. As with joint fire support, a stringent system of checks and balances would preclude frivolous diversion of limited resources. For example, when diverting J-CAS support, the JFC or affected components commander(s) must approve all requests for diversion of direct support air capabilities/forces.[48] This same approval process would be established concurrent with the grant of divert authority to the J-SEAD Manager.

Even though the described J-SEAD Manager does not yet exist, the concept of a reactive SEAD Manager has precedence.[49] Given the Marine Air Ground Task Force (MAGTF) reliance on aerial fire support, Marine SEAD planners realize that mobile GBAD can introduce prohibitive interference without notice. To quickly counter these threats and return to providing critical air support, MAGTF SEAD planners have constructed reactive SEAD templates for artillery, and fixed- and rotary-wing responses to several tactical SAMs. Marine aviation has applied and refined the reactive SEAD concept since 1994 and implemented the construct in support of combat operations in both Bosnia and Iraq. While the Marine Corps model is tailored to localized suppression requirements of the MAGTF, an analogous command and control method is applicable at the operational level, embodied in the proposed J-SEAD Manager concept.

Before implementing such a J-SEAD Manager construct, the model must be tested and refined. Recurring 'Green Flag' exercises are the best forum to validate the J-SEAD Manager concept and optimize the command and control structure in a regulated environment. These exercises are conducted on fully instrumented, open-air ranges outside Nellis Air Force Base and incorporate aircraft from the U.S. and NATO countries. In the past, Army MLRS and attack helicopters have participated in these exercises as well.

Since the J-SEAD JT&E program office is collocated with Green Flag, it is uniquely positioned to fully develop and refine this nascent J-SEAD Manager structure. The JT&E program's charter should be extended in order to conduct a series of evaluation exercises incorporating the J-SEAD Manager concept. based on the results of these evaluations, the JT&E program should draft an update to J-SEAD doctrine.[50] Recommended doctrinal changes should focus on two areas: the concise delineation of roles and responsibilities of a J-SEAD Manager at the operational level, and the optimal command and control structure within a Joint or Combined Task Force for integrating air, land, and maritime fires to rapidly locate and destroy advanced ground based air defenses.

CONCLUSION

The technological chess game between air superiority and access denial continues unabated and future air defenses may soon eclipse air power in its ability to deny access to contested theaters.[51] Coupled to this, the proliferation of modern radar-guided SAMs is expected to drastically increase in the very near future. As highlighted in the Kosovo/Operation ALLIED FORCE After-Action Report:

> The Yugoslav air defense systems do not represent the state of the art. Much more capable systems are currently available in the international arms market. In the years ahead, the U.S. can expect to face adversaries armed with these state-of-the-art systems, and the DoD needs to prepare for that possibility now.[52]

Despite this stark warning, scant progress has been made to counter advanced air defense systems. A 2001 General Accounting Office report on Electronic Warfare states that, "Within the Department of Defense, no comprehensive, cross-service strategy for closing the gap between the services' suppression capabilities and needs exists – and no coordinating entity has been tasked with preparing such a strategy."[53] Given the U.S. reliance on aerial fires to forcibly gain access to contested theaters, J-SEAD doctrine must adjust its command and control methods to reactively locate and destroy advanced ground based air defense targets.

The immediate solution to bridging this gap in suppression requirements and capabilities is designating the JFACC as the J-SEAD Manager. With the authority to pool resources from all components, and divert fires onto air defenses prohibitively interfering with air operations, the J-SEAD Manager would enable operational fires throughout the JOA.

The J-SEAD Manager concept is consistent with existing joint doctrine for air defense suppression and fire support. Furthermore, creating this position is feasible today and allows integration of future technologies to include advanced weapon systems, long-range precision weapons, and follow-on generations of stealth. J-SEAD will remain the ultimate enabler for all operational missions as long as countries continue to rely on ground based air defenses to protect vital infrastructure and deployed forces from aerial fires and intrusion.

END NOTES

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[3] RADM Yedidia and CDR Joergenson provide detailed discussions of this integrated defense concept. Ya'ari, Yedidia, Rear Admiral (Israeli Navy), "The Littoral Arena: A Word of Caution," Naval War College Review, 48 (Spring 1995): 18; Joergensen, Tim, Commander (Royal Danish Navy), "U.S. Navy Operations in Littoral Waters: 2000 and Beyond," Naval War College Review, 51 (Spring 1998): 24-26.

[4] Jay Johnson, Admiral (USN), "Anytime, Anywhere: A Navy for the 21st Century." U.S. Naval Institute Proceedings, 123 (November 1997): 49.

[5] With modest missile modifications, the SA-12 boasts the ability to engage aircraft and cruise missiles in excess of 250 nm. Christopher F. Foss and James C. O'Halloran, eds. "Antey S-300V (SA-12a 'Gladiator'/ SA-12b 'Giant') Family of Low- to High-Altitude Surface-to Air Missile Systems Jane's Land-Based Air Defense 2002-2003. 29 August 2001. <http://www.janes.com/self-propelled surface-to-air missiles, russian federation and associated states> [07 January 2002]. (Hereafter cited as "SA-12 Family"); Christopher F. Foss and James C. O'Halloran, editors. "Almaz S-300 (SA-10 'Grumble') Family of Low- to High-Altitude Surface to Air Missile Systems." Jane's Land-Based Air Defense 2002-2003. 13 July 2001. <http://www.janes.com/self-propelled surface-to-air missiles, russian federation and associated states> [07 January 2002]. (Hereafter cited as "SA-10 Family"); David A. Fulghum, "Stealthy JASSM Approved for Low-Rate Production." Aviation Week & Space Technology 156 (January 7, 2002): 25.

[6] SA-10b,c, and d variants, and both SA-12 variants advertise the capability to move into unsurveyed sites and fire within five minutes. SA-12 pre-launch procedures take only 15 seconds. Concern Antey, S-300V: Multichannel Mobile Surface-to-Air Missile System (Moscow, Russia: 1994), 1; "SA-12 Family"; "SA-10 Family."

[7] James Hasik, "Air Defenses After Kosovo." U.S. Naval Institute Proceedings, 127 (December 2001): 74.

[8] Brungess, pp. 170-171.

[9] SA-12 manufacturers claim the ability to detect targets as small as 0.0002 m^2. In 2001, Russian air defense officials admitted they had acquired remains of the Air Force F-117 shot down over Yugoslavia in 1999 and have been using pieces of the aircraft to improve their ability to detect and engage stealth aircraft. "SA-12 Family"; David A. Fulghum and Robert Wall, "Russians Admit Testing F-117 Lost in Yugoslavia." Aviation Week & Space Technology, 155 (October 8, 2001): 80.

[10] Benjamin S. Lambeth, The Transformation of American Air Power (Ithaca: Cornell University Press 2000), 157.

[11] General Accounting Office (GAO), Electronic Warfare: Comprehensive Strategy Needed for Suppressing Enemy Air Defenses, Report to Congressional Requesters, (Washington, DC: 2001), 7-8.

[12] Brungess, p. 169.

[13] Michael Puttre, "Good Move: New Thinking in Air Defense Networks Puts SEAD in Check." Journal of Electronics Defense, 124 (May 2001): 42.

[14] Hasik, p. 76; Zaloga, "Future Trends in Air Defense," p. 46; "SA-10 Family"; "SA-12 Family."

[15] Steven J. Zaloga, "The Evolving SAM Threat: Kosovo and Beyond." Journal of Electronic Defense, 123 (May 2000): 45,46.

[16] Steven J. Zaloga, "Grumble: Guardian of the Skies – Part 2." Jane's Intelligence Review, 9 (April 1997): 156.

[17] GAO, p. 10.

[18] Joint Chiefs of Staff, JTTP for Suppression of Enemy Air Defenses (J-SEAD), Joint Pub 3-01.4 (Washington, DC: 25 July 1995), I-5. (Hereafter cited as JP 3-01.4.)

[19] Ibid., p. viii, II-3.

[20] Puttre, p. 44.

[21] Joint Chiefs of Staff, Doctrine for Joint Fire Support, Joint Pub 3-09 (Washington DC: 12 May 1998), I-6. (Hereafter cited as JP 3-09.)

[22] Kenneth G. Krech, CDR (USN), "The Navy Must Suppress Enemy Air Defenses." U.S. Naval Institute Proceedings, 121 (October 1995): 79.

[23] Brungess, p. 77.

[24] Department of Defense, Director of Operational Test & Evaluation (DOD, DOT&E), "Joint Suppression of Enemy Air Defenses (JSEAD)." Fiscal Year 2000 Annual Report (Washington, DC: 2001) VII-27. <http://www.dote.osd.mil/reports/FYOO/00jtetoc1.html> [25 January 2002].

[25] Fulghum, "Stealthy JASSM Approved for Low-Rate Production," p. 25.

[26] Tony Cullen and Christopher F. Foss, foreword to Jane's Land Based Air Defense (2000-2001, 13th Edition): 11.

[27] Benjamin S. Lambeth, NATO's Air War for Kosovo, MR-1365-AF, (Santa Monica, CA: RAND, 2001), 13.

[28] Ibid., p. 21.

[29] Ibid., p. 37.

[30] Ibid., p. 106.

[31] Ibid., p. 103.

[32] Ibid., p. 107.

[33] Ibid., p. 122.

[34] Ibid., p.105.

[35] Exact numbers of radar-guided missiles launched during Operation ALLIED FORCE vary from 600 to over 800, based on account and date of material. John A. Tirpak, "Short's View of the Air Campaign." Air Force Magazine, 82 (September 1999). <<http://www.afa.org/magazine/watch/0999watch.html>> [15 December 2001]; Lambeth, NATO's Air War for Kosovo, p. 105; Department of Defense, Kosovo / Operation ALLIED FORCE After-Action Report (Washington, DC: 2000), xxiii.

[36] GAO, p. 7; Lambeth, NATO's Air War for Kosovo, p. 111.

[37] Lambeth, NATO's Air War for Kosovo, p. 102.

[38] Ibid., p. 153.

[39] Cullen and Foss, p. 11.

[40] Congressman Joseph R. Pitts (R-PA) co-chairs the U.S. Congressional Electronic Warfare Working Group. "The Hill's Strongest EW Advocate: 20 Questions with US Congressman Joseph R. Pitts." Journal of Electronic Defense, 124 (May 2001): 47.

[41] Kosovo/OAF AAR, pp. 70-71.

[42] Brungess, p. 75.

[43] DOD, DOT&E, p. VII-27.

[44] Commandant of the Marine Corps, Suppression of Enemy Air Defense (SEAD), Marine Corps Warfighting Publication (MCWP) 3-22.2 (Quantico, VA: 18 May 2001), 1-1. (Hereafter cited as MWCP 3-22.2.)

[45] John K. Yager and Jeffery L. Froysland, "Improving the Effects of Fires with Precision Munitions," Field Artillery, 2 (February 1997): 7; and Jane's Information Group, "TI to Develop EX-171 ERGM," Janes Navy International, 101 (September 1996): 8; quoted in Micheal P. Marletto, "The Impact of Emerging Munitions

Technology on 21st Century Warfare," (Unpublished Research Paper, National Defense University, Washington, DC: 1999), 6-7.

[46] JP 3-09, p. I-7.

[47] Ibid., p. I-4.

[48] Ibid., p. IV-5.

[49] The latest update to MCWP 3-22.2 formalizes the Reactive SEAD (RSEAD) Manager concept and defines roles and responsibilities. The RSEAD Manager directs RSEAD strikes through either pre-planned, pre-planned on-call, or diverted fires. In accordance with the Tactical Air Commander's guidance, the RSEAD Manager coordinates RSEAD fires with the Tactical Air Control Center (TACC) and directs execution through the Direct Air Support Center (DASC) and the senior Fire Support Coordination Center (FSCC). Based upon the location, and the nature of the prohibitively interfering air defense threat, RSEAD fires are prioritized among artillery, rotary wing aircraft, and fixed wing aircraft. MWCP 3-22.2, Chapter 3.

[50] Originally chartered in the summer of 1996, the Air Force-led J-SEAD JT&E was directed to "characterize the reactive J-SEAD targeting process" and "test and evaluate potential improvements." Computer-aided exercises and live-fly tests have been conducted in conjunction with Green Flag exercises in 1998 and 2000. Based upon the program's directed scope, and experience supervising Joint and Combined SEAD exercises, it seems logical to extend the program's charter to explore the J-SEAD Manager concept. DOD, DOT&E, p. VII-27-29.

[51] Brungess, p. 135.

[52] Kosovo/OAF AAR, p. 70.

[53] GAO Report 01-28, p. 3.

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